

Claims

- [c1] 1. A method for minimizing network congestion during large payload delivery comprising:
- sending a search request to determine which nodes in a network have content for a requesting node, said network having a plurality of nodes;
- receiving a response to said search request from each of one or more responding nodes having said content;
- determining from said response which of said responding nodes are a desired set of nodes to download said content from;
- downloading said content from said desired set of nodes; and
- storing said downloaded content onto said requesting node.
- [c2] 2. The method of claim 1, wherein at least a portion of said content is stored in a plurality of block files in each of said responding nodes.
- [c3] 3. The method of claim 1, wherein said plurality of nodes is arranged in the form of a virtual tree for passing control information.
- [c4] 4. The method of claim 3, wherein each node of said plurality of nodes has a set of attributes and a set of rolled up attributes for identification.
- [c5] 5. The method of claim 4, wherein said set of attributes comprises a bitmap and said set of rolled up attributes is a combination of all lineal descendants of said node.
- [c6] 6. The method of claim 5, wherein said combination is the binary OR of said all lineal descendants of said node.
- [c7] 7. The method of claim 4, wherein said sending a search request comprises said requesting node sending a notification to neighbor nodes in said virtual tree to determine the existence of said content, said notification comprising distribution criteria of said content.
- [c8] 8. The method of claim 7, wherein each of said neighbor nodes receiving said search request forwards said search request to nodes that are neighboring said

neighbor nodes, excepting said requesting node, wherein said search request is propagated to one or more nodes of said plurality of nodes in said network that satisfy said distribution criteria.

[c9] 9. The method of claim 1, wherein said response specifies which portion of said content said responding node has and performance characteristics of said responding node.

[c10] 10. The method of claim 2, wherein more than one of said responding nodes maintain overlapping subset of block files stored in a plurality of local storage devices.

[c11] 11. The method of claim 9, wherein said desired set of nodes comprises nodes in close proximity to said requesting node, said desired set of nodes comprising nodes identified as least congested as determined by said performance characteristics.

[c12] 12. The method of claim 2, wherein said downloading of said block files occurs in parallel from said desired set of nodes.

[c13] 13. The method of claim 11, wherein said nodes in close proximity comprise nodes having the least latency.

[c14] 14. A method for minimizing network congestion during large payload delivery comprising:
sending a search request to determine which nodes in a network have content for a requesting node, said network having a plurality of nodes;
receiving responses to said search request from a plurality of responding nodes having said content, wherein at least a portion of said content is stored in a plurality of block files in each of said plurality of responding nodes, said responses identifying portions of said content in said plurality of responding nodes and performance characteristics of said responding nodes;
determining from said response which nodes of said plurality of responding nodes are a desired set of nodes to download said content from, wherein said desired set of nodes have a threshold level of latency to said requesting node

and are identified as least congested nodes as determined by said performance characteristics;
downloading and storing said content from said desired set of nodes onto said requesting node.

- [c15] 15. A method for minimizing network congestion during large payload delivery comprising:
- sending a search request to determine which nodes in a network have content for a requesting node, said network having a plurality of nodes;
 - receiving a response to said search request from a plurality of responding having said content, wherein at least some portion of said content is stored in a plurality of block files in a plurality of storage devices in each of said responding nodes, said response identifies a portion of said content a responding node has and performance characteristics of said responding node, at least one of said plurality of responding nodes having the same portion of said content;
 - determining from said response which of said responding nodes are a desired set of nodes to download said content from, wherein said desired set of nodes are those nodes nearest to said requesting node in said network that are least congested as determined by said performance characteristics;
 - downloading said content in parallel from said desired set of nodes and storing said content in said requesting node.

- [c16] 16. A computer program product comprising:
- a computer usable medium comprising computer readable code for minimizing network congestion during large payload delivery, said computer readable program code configured to:
 - send a search request to determine which nodes in a network have content for a requesting node, said network having a plurality of nodes;
 - receive a response to said search request from each of one or more responding nodes having said content;
 - determine from said response which of said responding nodes are a desired set of nodes to download said content from;

download said content from said desired set of nodes; and
store said downloaded content onto said requesting node.

- [c17] 17. The computer program product of claim 16, wherein at least a portion of said content is stored in a plurality of block files in each of said responding nodes.
- [c18] 18. The computer program product of claim 16, wherein said plurality of nodes is arranged in the form of a virtual tree.
- [c19] 19. The computer program product of claim 18, wherein each node of said plurality of nodes has a set of attributes and a set of rolled up attributes for identification.
- [c20] 20. The computer program product of claim 19, wherein said set of attributes comprises a bitmap and said set of rolled up attributes is a combination of all lineal descendants of said node.
- [c21] 21. The computer program product of claim 20, wherein said combination is the binary OR of said all lineal descendants of said node.
- [c22] 22. The computer program product of claim 19, wherein said send a search request comprises said requesting node sending a notification to neighbor nodes in said virtual tree to determine the existence of said content, said notification comprising distribution criteria of said content.
- [c23] 23. The computer program product of claim 22, wherein each of said neighbor nodes receiving said search request forwards said search request to nodes that are neighboring said neighbor nodes, excepting said requesting node, wherein said search request is propagated to one or more nodes of said plurality of nodes in said network that satisfy said distribution criteria.
- [c24] 24. The computer program product of claim 16, wherein said response specifies which portion of said content said responding node has and performance characteristics of said responding node.

- [c25] 25. The computer program product of claim 17, wherein more than one of said responding nodes maintain overlapping subset of block files stored in a plurality of local storage devices.
- [c26] 26. The computer program product of claim 24, wherein said desired set of nodes comprises nodes in close proximity to said requesting node, said desired set of nodes comprising nodes identified as least congested as determined by said performance characteristics.
- [c27] 27. The computer program product of claim 17, wherein said download of said block files occurs in parallel from said desired set of nodes.
- [c28] 28. The computer program product of claim 26, wherein said nodes in close proximity comprise nodes having least latency.
- [c29] 29. An apparatus for minimizing network congestion during large payload delivery comprising:
a network comprising a plurality of nodes;
a first server in a first server cluster sending a search request to determine which nodes in said network have content for a requesting node of said network, said first server cluster having one or more first servers, said first server receiving a response to said search request from each of one or more responding nodes having said content, said first server cluster determining said response which of said responding nodes are a desired set of nodes to download said content from, and said one or more first servers in said first server cluster downloading said content from said desired set of nodes and storing said downloaded content onto said requesting node.
- [c30] 30. The apparatus of claim 29, wherein at least a portion of said content is stored in a plurality of block files in each of said responding nodes.
- [c31] 31. The apparatus of claim 29, wherein said plurality of nodes is arranged in the form of a virtual tree.
- [c32] 32. The apparatus of claim 31, wherein each node of said plurality of nodes has

a set of attributes and a set of rolled up attributes for identification.

- [c33] 33. The apparatus of claim 32, wherein said set of attributes comprises a bitmap and said set of rolled up attributes is a combination of all lineal descendants of said node.
- [c34] 34. The apparatus of claim 33, wherein said combination is the binary OR of said all lineal descendants of said node.
- [c35] 35. The apparatus of claim 32, wherein said sending a search request comprises said first server in said requesting node sending a notification to neighbor nodes in said virtual tree to determine the existence of said content, said notification comprising distribution criteria of said content.
- [c36] 36. The apparatus of claim 35, wherein a first server in each of said neighbor nodes receiving said search request forwards said search request to nodes that are neighboring said neighbor nodes, excepting said requesting node, wherein said search request is propagated to one or more nodes of said plurality of nodes in said network that satisfy said distribution criteria.
- [c37] 37. The apparatus of claim 29, wherein said response specifies which portion of said content said responding node has and performance characteristics of said responding node.
- [c38] 38. The apparatus of claim 30, wherein more than one of said responding nodes maintain overlapping subset of block files stored in a plurality of local storage devices.
- [c39] 39. The apparatus of claim 37, wherein said desired set of nodes comprises nodes in close proximity to said requesting node, said desired set of nodes comprising nodes identified as least congested as determined by said performance characteristics.
- [c40] 40. The apparatus of claim 30, wherein said downloading of said block files occurs in parallel from said desired set of nodes.

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[c41]